

We are looking for a PhD student and a postdoctoral appointee to work in one of the two detailed projects below under the supervision of [Prof. Dr. Antonio Picón](#) at University Autónoma de Madrid (Spain).

**Starting date:** There is a certain flexibility, but ideally the position should start **between September and December 2022**, and may be funded for two-three years, subject to the positive evaluation of the hired researcher.

#### RESEARCH PROJECTS:

##### **Light-induced non-equilibrium dynamics in two-dimensional materials**

In the recent years, our group has developed novel approaches to account for light-matter and electron-electron interactions on an equal footing in a real-time framework. We plan to investigate fundamental questions such as the birth of excitons and energy renormalizations in the time domain, the coherence of the non-equilibrium dynamics in the attosecond scale, and the role of light-induced electron dynamics in topological and magnetic materials. A training program will cover condensed-matter theory, many-body theory, x-ray physics, electronic structure and dynamical calculations, and HPC programming.

##### **Resolving local chemical bonds changes**

Charge transfer and chemical bond changes play a fundamental role in relevant photoinduced phenomena. The advent of free-electron laser (XFEL) facilities have opened the possibility to investigate and manipulate chemical bonds with unique temporal and spatial resolution. We plan to develop novel theoretical approaches and model realistic ultrafast and non-linear XFEL experiments. Our group collaborates closely with leading experimental groups in the field. A training program will cover quantum chemistry theory, x-ray physics, electronic structure and excited state calculations, continuum orbital calculations, and quantum and semiclassical nuclear dynamics methods.

#### PHD AND POSTDOCTORAL CANDIDATE PROFILE:

- **Master** degree in **Physics, Material Physics, Chemical Physics** or **related** for PhD position
- **PhD** degree in **Physics, Material Physics, Chemical Physics** or **related** for postdoctoral position
- Experience in C++/Julia/Python programming, electronic structure calculations (QuantumEspresso, SIESTA, MOLCAS, etc.), and/or dynamical calculations (TDSE, SHARC, etc.) will be positively considered

- Strong background in condensed-matter theory, many-body theory, non-equilibrium dynamics, quantum chemistry, and/or x-ray physics will be positively considered

**APPLICATION:**

Applicants should send his/her CV, including the names of two persons of reference, and contact information (in a single pdf file named as the candidate) to [atto2d@uam.es](mailto:atto2d@uam.es). The search will be open until a good candidate is found. Please, include the reference ELDUT in the subject of your message.

Recommendation letters could be requested during the selection process.

Selected candidates shall be contacted for an interview.

The salary follows European/Spanish standard scales and will depend on experience and qualifications of the candidate.